California State University, Los Angeles

Los Angeles, California
Principal Investigator: Dr. Helen Ryaciotaki-Boussalis

NASA URC SPACE Center

This proposal requests funds to continue the investigation and development of key technologies related to critical NASA missions and programs. The research and associated educational activities will be performed at the Structures Propulsion And Control Engineering (SPACE) University Research Center (URC) at California State University, Los Angeles (CSULA). Over a five-year period, the URC will work in partnership with Dryden Flight Research Center (DFRC) as the lead NASA center, and JPL (Jet Propulsion Laboratory) as the secondary NASA center. The URC will continue its close collaboration with Boeing and Northrop Grumman. The major areas of research in the URC will be directly related to the missions of the Aeronautics Research Mission Directorate (Uninhabited Aerial Vehicles (UAVs), and Combustion) and Exploration Systems Mission Directorate (James Webb Space Telescope), addressing and supporting some of these missions' key challenges.

To address the technology challenges of both Directorates, the SPACE center will continue to conduct research and development in the following specific Research Areas:

- Intelligent and Autonomous Control;
- UAVs;
- Wind-Tunnel Testing;
- Optimization of Propulsion Systems;
- Thermal Analysis of Systems;
- Bio-derived Liquid Fuel;
- Space Telescope Technology;
- Decentralized and Reconfigurable Control;
- Embedded Architectures.

CSULA is a federally designated Title III and Minority Serving Institution (MSI). Founded in 1947, CSULA is the only one of California State University's 23 campuses designated to have an urban mission. The URC shares NASA's commitment to increasing the number of minority students who will pursue and earn advanced degrees and become the influential scientists and engineers of tomorrow. It will continue to add pedagogical value by integrating research into their educational experience and by improving the College's curriculum.

Florida International University

Miami, Florida
Principal Investigator: Dr. Fernando Miralles-Wilhelm

WaterSCAPES: Science of Coupled Aquatic Processes in Ecosystems from Space

WaterSCAPES: Science of Coupled Aquatic Processes in Ecosystems from Space is a proposed NASA Group 4 University Research Center (URC) based at Florida International University under a FY2008 Cooperative Agreement Notice. This URC focuses on an integrated set of research and education activities centered on the coupled interaction between the hydrologic cycle and vegetation dynamics at the scale of ecosystems, analyzing the spatial and temporal changes of this interaction and determining the influence of these changes on water cycling, vegetation structure, biomass dynamics and biodiversity. The focus of WaterSCAPES is motivated by NASA's Science Mission Directorate fundamental question: How is the Earth changing and what are the consequences for life on Earth?, and specifically seeks to address the stocks and fluxes of water, nutrients and vegetative biomass through a quantitative approach that combines remote sensing observations (radar and optical), mathematical modeling of ecohydrologic processes and field ecophysiological experiments. The proposed work will be performed on two wetland ecosystems: the Everglades of South Florida and the Sian Ka'an Biosphere Reserve in the Yucatan peninsula of Mexico. The primary impacts of the proposed project will be:

(i) quantification of biogeochemical stocks and fluxes in vegetative ecosystems in response to environmental forcings (climate change, disturbances) as key to sustainable management of vegetative ecosystems;
(ii) gain expertise in the vast wealth of new data from NASA's EOS and in-house satellites in interdisciplinary research on interactions and feedbacks between hydrology and vegetation;
(iii) training a new generation of global ecosystem change scientists who will acquire strong interdisciplinary science skills applicable to ecosystem change assessment and mitigation. Being in Miami, FIU is already engaged with one of the largest underrepresented student populations in STEM fields in the US, so diversity in science and engineering in our country will be highly favored by this URC.

Howard University

Washington, District of Columbia
Principal Investigator: Dr. Everette Joseph

Howard University Beltsville Center for Climate System Observation

Howard University is leading a transformation of the atmospheric sciences; -- a discipline where minorities who have been traditionally underrepresented, will become acknowledged leaders in the field. The Howard University Program in Atmospheric Science in its relatively short life has produce 9 Ph.D.s, and 10 MS, and based on current enrollment is poised over the next three years to graduate more than half the number of minority Ph.D.s that has been produced nationally in atmospheric science over the past decade. This success is directly attributable to previous support from NASA Minority University Research and Education Program (MURED) and through more recent partnership with NOAA. Producing scientific leaders and experts requires an advance graduate program that engages students in research on the vanguard of the discipline. To that end Howard has assembled a cadre of talented faculty who are already making significant contributions for example in their leadership of international field experiments in West Africa to study the genesis of tropical storms. They have fostered productive research collaborations with NASA scientists. The Water Vapor Variability Satellite/Sondes (WAVES) field experiment that was conducted at the Howard University Beltsville Campus between 2006 and 2008 is one such example. WAVES accomplished important science for NASA in terms of AURA and AIRS ground validation (as evidenced by the resulting publications) while engaging numerous graduate and undergraduate students.

In is within the context of these accomplishments and high, yet achievable aspirations that Howard University proposes for the establishment of a Group 4 University Research Center (URC) at the Howard University Beltsville Campus. The modest achievements that Howard has made in attempting to diversity the atmospheric science is not sustainable. URC will play a critical role in helping Howard's unique program to establish the capacity to make sustainable research contributions that are valuable to NASA Science Mission Directorate (SMD) long-term goals, and to help provide a diverse well-qualified workforce to achieve those goals.
The propose URC will consist of a multidisciplinary group of Howard University faculty in close partnership with NASA/GSFC Earth Sciences Division, other academic institutions and government laboratories and private sector partners. The overall mission of the new center will be to:

- Engage in basic research with the view that the resulting knowledge will improve weather, climate, and air quality prediction through intensive and long-term field atmospheric observations
- Train science and academic leaders (minority Ph.D.s) with emphasis on understanding atmospheric process through the use of state-of-the-art atmospheric observing systems and analytical methods
- Inspire and engage K-12 and undergraduate students through sustainable outreach programs
- Contribute to national and international climate research programs and networks designed to investigate the causes of climate and regional environmental change through reference observations of key state variables

Morgan State University

Baltimore, Maryland
Principal Investigator: Dr. S. Keith Hargrove

Center of Excellence in Systems Engineering for Space Exploration Technologies (CESET)

Morgan State University's Clarence M. Mitchell, Jr. School of Engineering submits this proposal with a vision to establish the Center of Excellence in Systems Engineering for Space Exploration Technologies (CESET) to support NASA Space Operations Mission Directorate role in supporting SMD and ESMD missions.

Goals
CESET will:

1. Conduct applied research in space exploration technologies that directly benefit NASA Goddard Space Flight Center (GSFC)
2. Provide system engineering oversight of these research initiatives.
3. Offer educational and professional programs in Systems Engineering through the Systems Engineering and Management Institute(SEMI).

The research initiatives will focus on technology development of solutions in Software Define/Cognitive Radio applications in support of GFSC space communications.

Objectives
CESET's objectives are

1. To provide an enriched, hands-on, academic environment in systems engineering for developing students and professional engineer.
2. To develop a system engineering framework and associated procedural requirements for guidance of all research initiatives.
3. To investigate architectures and algorithms for implementation in intelligent radio applications

Method of Approach
CESET plans to replicate and adapt the systems engineering processes commonly used throughout NASA and implement a research protocol within an academic environment to provide engineering students with the practical learning process of systems engineering. This learning process will be coupled with students taking courses in systems engineering and participating in the research initiatives.

Outcome of CESET
Is to produce a pool of engineering graduates with research skills and knowledge of the systems engineering approach prepared to enter the workforce to make an immediate impact on product and process development.

Prairie View A & M University

Prairie View, Texas
Principal Investigator: Dr. Richard Wilkins

The Center for Radiation Engineering and Science for Space Exploration (CRESSE)

Prairie View A&M University (PVAMU), a HBCU, proposes a research center with the infrastructure to investigate the scientific and engineering challenges faced by NASA and the international space community caused by space radiation. CRESSE will focus on space radiation research directly applicable to astronaut health and safety during future lunar and Martian missions. The research approach will consist of experimental and theoretical radiation modeling studies utilizing particle accelerator facilities including:

- NASA Space Radiation Laboratory (NSRL) at Brookhaven National Laboratory;
- Proton Synchrotron at Loma Linda University Medical Center;
- Los Alamos Neutron Science Center (LANSCE) at Los Alamos National Laboratory.

Specifically, CRESSE investigators will design, develop and build an experimental test bed that will simulate the lunar and Martian radiation environments and be used in radiation studies at these facilities. Each investigator will pursue independent and collaborative research utilizing the test bed. CRESSE investigators have broad expertise in space radiation and will use methods focused on:

1. Space Radiation Environment Modeling;
2. Monte-Carlo Radiation Transport Modeling;
3. Space Radiation Instrumentation and Dosimetry;
4. Space Radiation Effects on Electronics;
5. Micro-composite Fabrication Using In Situ Materials.

The research goal is to maximize the technical readiness level of radiation instrumentation for human and robotic missions, optimizing the return value of CRESSE for NASA exploration. Outcomes and knowledge will be applied to a variety of scientific and engineering disciplines vital for safe and reliable execution of future space exploration missions which can be negatively impacted by the space radiation environment. The educational goal will be to enhance STEM programs and increase the number of African-Americans and other underrepresented minorities obtaining advanced degrees in STEM disciplines, especially the Ph.D. in electrical engineering; established, in part, by infrastructure built during the Center for Applied Radiation Research (CARR - URC Group II) program.

Texas Southern University

Houston, Texas
Principal Investigator: Dr. Olufisayo Jejelowo

Center for Bio-Nanotechnology and Environmental Research(C-BER)

Texas Southern University (TSU), the second largest Historically Black College and University, and its new administration strongly supports the NASA C-BER and will employ a team of faculty from the departments of biology, chemistry, mathematics; and colleges of business, education, law and public affairs to support outcome one of the NASA Education Strategic Framework. The team will build strategic partnerships with educational and commercial institutions, along with government employees, to train and educate students and postdoctoral fellows. NASA C-BER will integrate molecular biology, bioinformatics, bionanotechnology with chemical and biochemical analysis to address important environmental and human health concerns related to manned exploration of space.

Techniques for detecting, monitoring and controlling microorganisms will be developed; and the effects of microgravity, radiation and other space travel-induced stress factors on living organisms will be investigated with the intent of developing countermeasures.

The research of C-BER is closely aligned with NASA's Exploration Systems Mission Directorate and is relevant to all NASA's mission directorates. Our successes will improve existing technologies and generate new inventions that increase speed and accuracy while decreasing cost. New technology developed or advanced will educate and drive the perception of what is possible in the realm of Space Life Sciences. Historically, synergism between science and technology has thrived at TSU as applied to microgravity induced stress and microbial detection/control. In this current effort we will develop advanced technologies to enable novel solutions to the great health challenges facing humans during long-term space duration missions.

Overall we shall develop a future workforce in STEM fields; improve TSU's research infrastructure and innovative partnerships; enhance astronaut and autonomous medical care; enhance technology transfers and commercialization; and improve quality of life on earth.

University of Puerto Rico, Rio Piedras Campus

San Juan, Puerto Rico
Principal Investigator: Dr. Carlos Cabrera

Center for Advanced Nanoscale Materials II

The Center for Advanced Nanoscale Materials (CANM) is an interdisciplinary and multi-campus research and education University Research Center (URC) partnership project between NASA and the University of Puerto Rico. CANM-NASA-URC will bring together thirteen researchers from three different campuses and four different departments to work on research projects relevant to NASA in collaboration with NASA Glenn Research Center (GRC), NASA Ames Research Center (ARC), and Jet Propulsion Laboratory (JPL), in areas that correspond primarily to the Exploration Systems Mission Directorate and secondarily to the Aeronautics Research Mission Directorate.

CANM-NASA-URC will make a strong contribution to the objectives of the NASA Education portfolio assigned to URCs: Faculty and Research Support, Student Support, and Targeted Institution Research and Academic Infrastructure. CANM-NASA-URC will improve the ability of three Hispanic-serving institutions strategically distributed across the Jurisdiction to enhance their research competency in areas of relevance to NASA and compete for NASA research and development work.

The research to be undertaken by CANM-NASA-URC is organized into four Interdisciplinary Research Groups (IRGs) aligned with the NASA Vision for Space Exploration:

- Life Support Systems;
- Advanced High Energy Materials;
- Non-Carbon Based Sensors; and
- Carbon-Based Sensors and Bio-Sensors.

A mechanism will be implemented to advance the evolution of research projects along the Technology Readiness Level (TRL) scale from TRL 1 to 3 in coordination and collaboration with NASA and JPL scientists. Projects reaching TRL 3 will be jointly evaluated to determine whether they merit to be developed into TRL 4 and above by transferring them to a NASA Center or JPL. Innovation, testbeds, and commercialization will be fostered by CANM-NASA-URC, while supporting research students and faculty research projects.